AEROSPACE DEFENSE COMMAND

REQUIRED OPERATIONAL CAPABILITY (ROC)

FOR

AN IMPROVED NUDET SURVEILLANCE AND REPORTING SYSTEM

ADCOM 4-77

HEADQUARTERS
AEROSPACE DEFENSE COMMAND
PETERSON AIR FORCE BASE, COLORADO 80914

19 AUGUST 1977

DEPARTMENT OF THE AIR FORCE
HEADQUARTERS AEROSPACE DEFENSE COMMAND
PETERSON AIR FORCE BASE, COLORADO 80914

REPLY TO ATTN OF: XPDQ

19 August 1977

SUBJECT: Required Operational Capability (ROC) for an Improved NUDET Surveillance and Reporting System

TO: HQ USAF/RDQ

1. The attached ROC is submitted for your approval and necessary action in accordance with AFR 57-1.

2. This ROC advocates the development and deployment of nuclear detonation (NUDET) sensors on the Global Positioning System (GPS) satellites and b(1) Since GPS launch booster planning depends on approval of secondary payloads on GPS, your immediate attention and validation of this ROC is requested.

W. C. BURROWS, Maj Gen, USAF
DCS/Plans and Programs

1 Atch
ADCOM ROC for an Improved NUDET Surveillance and Reporting System

DEPARTMENT OF THE AIR FORCE

HEADQUARTERS AEROSPACE DEFENSE COMMAND

PETERSON AIR FORCE BASE, COLORADO 80914

REPLY TO ATTN OF: XPDQ (Capt Harmon, AV 692-3054) 19 August 1977

SUBJECT: Required Operational Capability (ROC) ADCOM 4-77, An Improved NUDET Surveillance System

TO:

STATEMENT OF NEED

1.

b(1)

2. To accomplish the above tasks and objectives, an improved nuclear detonation (NUDET) surveillance and reporting system is required. This system must be responsive to the needs of the National Command Authorities (NCA) and Unified/Specified Commanders for NUDET information.

b(1)

STATEMENT OF OPERATIONAL CAPABILITY

1. The qualitative requirements for an improved NUDET surveillance and reporting system are:

a. Global Coverage. Global NUDET surveillance and reporting is required because of the worldwide deployment of U.S. forces, the increasing number of nuclear-capable countries, and the increasing possibility of a nuclear exchange between countries other than the U.S. and the Soviet Union.

b(1)

b(1)

d. Timeliness. The system must provide near real-time reporting to support decision making of the NCA and unified/specified commanders.

e. Exercise/Test Capability. The capability to inject simulated NUDETs into the system is required to permit realistic worldwide testing, exercise and evaluation of the system.

2. Quantitative performance goals for a NUDET detection and reporting system were developed in the Missile and NUDET Surveillance (MANS) Study, a joint effort conducted in 1975 by ADCOM, Strategic Air Command, Air Force Systems Command and the Air Force Technical Applications Center (AFTAC). Subsequently, the WWMCCS System Engineering Office (WSEO) refined these goals and defined the WWMCCS NUDET surveillance needs and the supporting rationale (ref: WSEO TPM 76-12, Nov 76). The WWMCCS NUDET surveillance goals are given in Table I. These goals are technically achievable at reasonable cost and are the ADCOM NUDET surveillance and reporting system requirements. Whereas the requirements to support strike assessment (determining the effectiveness of U.S. strikes) are more stringent than those in Table I, satisfying Table I goals will satisfy the requirements for attack characterization, strike confirmation (confirming that a U.S. weapon has detonated in the vicinity of the programmed target) and improved indirect RECA.

3.

b(1)

	PARAMETER	GOAL
INFORMATION-RELATED CHARACTERISTICS	Location Altitude Yield Time Count	b(1)
SYSTEM-RELATED CHARACTERISTICS	Detection Sensitivity Coverage Max. Burst Rate Report Timeliness Availability Survivability	b(1)

TABLE I. WWMCCS NUDET SURVEILLANCE GOALS

b(1)

4. b(1)

W. C. BURNEWS, Maj Gen, USAF
DCS/Plans and Programs

3 Atch
1. Expanded Rationale
2. Preferred Solution
3. Distribution List

EXPANDED RATIONALE

1. ADCOM is tasked to conduct surveillance and reporting of nuclear bursts worldwide.

b(1)

c. RECA is a responsibility of all Unified and Specified Commands. It provides the NMCS with information concerning U.S. residual operational/resource capability in a post-attack nuclear environment. Information provided to the NMCS includes status of:

(1) Command and Control facilities.

(2) Offensive strategic nuclear forces.

(3) Defensive forces and facilities.

(4) Tactical nuclear forces.

(5) Military support forces.

(6) Fallout information.

(7) Communications resources.

Indirect RECA, based on NUDET information, provides for a near realtime assessment of remaining operational capability and enables more effective use of direct, visual RECA resources.

b(1)

e. NUDET information supports civil defense authorities in enhancing population survival after an attack and in assessing damage to civilian resources. This information is vital for planning national recovery.

2.

b(1)

In order to provide the necessary accuracy and detail, an improved NUDET surveillance system is required to provide near realtime global NUDET detection and reporting.

3. Current Capability/Deficiencies.

b(1)

4.

b(1)

b(1)

b(1)

5. The major limitations of the current tactical NUDET surveillance capability are summarized as follows:

b(1)

b(1)

PREFERRED SOLUTION AND ALTERNATIVE

1. Preferred Solution. The preferred alternative is based on the Integrated Operational NUDET Detection System (IONDS). IONDS would include b(1) sensors placed on Global Positioning System (GPS) satellites, b(1)

2. The baseline IONDS would consist of the following segments:

b(1)

3.

b(1)

b(1)

4. GPS b(1) contribution to the IONDS performance goals are summarized as follows:

a. IONDS on GPS provides global coverage;

b(1)

5. The estimated performance of IONDS is given in Table 2.

6. Cost. The cost of IONDS (development plus ten years O&M) has been estimated to be less than $120M. However, this cost does not include command unique interface requirements nor the cost to install IONDS receivers/processors on the airborne command post aircraft, which has been estimated to be in excess of $150M. More cost effective means of providing IONDS data to the airborne command post must be determined.

7. Maintenance Concept. The nature of IONDS equipment, being primarily integrated into other systems, dictates that this equipment be maintained in accordance with the concepts or plans for these other systems. That is:

a. The satellite-borne IONDS components will be contractor designed, fabricated, tested and installed in the respective b(1) GPS satellites.

b(1)

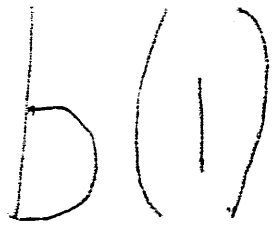
c. The space segment of the GPS/IONDS will be maintained in accordance with the concepts for GPS.

TABLE 3

PROJECTED IONDS PERFORMANCE

CHARACTERISTIC	ESTIMATED PERFORMANCE
Coverage	Global
Detection (Min Yield)	b(1)
Location	
Height of Burst	
Count Rate	
Yield	
Burst Time	
Survivability	
Availability	
Time of First Report	

b(1)



b(1)

d. The maintenance concept for the GPS/IONDS ground terminals will be determined by the host agency.

e. In the event that IONDS terminals are tactically deployed (i.e., on ships and ground vehicles) the maintenance concepts for these equipments will have to be defined by the tactical users.

f. Consistency of user information can only be achieved through ADCOM management of IONDS integration and duplicate report elimination software and readout equipment operations. However, display processing management will be accomplished by the single manager for the Command Center Processing and Display System (CCPDS).

A primary concern in the design of all IONDS ground equipment should be commonality with collocated equipment, thus reducing life cycle costs. Commonality of equipment will reduce the need for unique technical data, spares, training and support equipment.

8. Time-Phasing. The deployment of GPS/IONDS depends on the GPS launch schedule. In order to achieve the required NUDET surveillance and reporting capability by 1985, NUDET sensors must be deployed on the initial operational GPS satellites to be launched in 1981. Delaying the deployment until GPS space shuttle launches poses the risk that an operational IONDS capability will not be achieved until 1990.

b(1)

9. Command and Control. CINCAD will exercise overall command and control of IONDS;

b(1)

10. Survivability. Survivability of system and data is achieved by:

a. Sensors on 24 GPS satellites.

b(1)

b(1)

b. Multiple ground terminals.

c. Redundant communications.

d. Satellite on-board store and playback capability.

b(1)

e.

11. Safety. The provisions of MIL-STD-882 shall be applied and, as a minimum, a preliminary hazard analysis and an operational hazard analysis of the overall operation, installation and test of the system shall be prepared.

12. Communications Security.

b(1)

13. Automatic Data Processing. Configuration management of the basic IONDS software and hardware, which will be common to all users, will be performed by ADCOM. Configuration management of display software will be accomplished by the single manager of the Xommand Center Processing and Display System.

14. Other Alternatives. In preparation for the IONDS Air Force Systems Acquisition Review Council in November 1976, the Air Force Systems Command (AFSC) investigated various alternative systems for satisfying NUDET surveillance and reporting requirements.

b(1)

The AFSC concluded that IONDS provides the most cost-effective solution.

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